

Remarks

Allowance of all claims is respectfully requested. Claims 1, 3-4, 9-11, 14-18, 21-22, 27, 29-30, 35-37, 40-44, 47-48, 53-56, 58, 60-61, 66-68, 70-75 & 78-79 remain pending.

35 U.S.C. §112:

By Applicants' prior amendment mailed February 19, 2004, independent claims 1, 27, 53 & 58 were amended to more particularly point out and distinctly claim certain features of Applicants' invention. The final Office Action rejects these prior submitted amendments under 35 U.S.C. §112, first paragraph, as well as under 35 U.S.C. §112, second paragraph. These rejections are respectfully traversed.

A decision of whether an invention has been sufficiently enabled requires determination of "whether one reasonably skilled in the art could make or use the invention from disclosures in the patent coupled with information known in the art without undue experimentation." *United States v. Telectronics, Inc.*, 827 F.2d 778, 785, 8 USPQ2d 1217, 1223 (Fed. Cir. 1988). Further, a patent need not teach, and preferably omits, what is well known in the art. *In re Buchner*, 929 F.2d 660, 661, 18 USPQ2d 1331, 1332 (Fed. Cir. 1991); *Hybritech, Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1384, 231 USPQ 81, 94 (Fed. Cir. 1986), *cert. denied*, 480 U.S. 947 (1987); and *Lindemann Maschinenfabrik GMBH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 1463, 221 USPQ2d 481, 489 (Fed. Cir. 1984).

If a statement of utility in the specification contains within it a connotation of how to use, and/or the art recognizes that standard modes of administration are known and contemplated, 35 U.S.C. §112 is satisfied (emphasize added). *In re Johnson*, 282 F.2d 370, 373, 127 USPQ 216, 219 (CCPA 1960); *In re Hitchings*, 342 F.2d 80, 87, 144 USPQ 637, 643 (CCPA 1965); and *In re Brana*, 51 F.2d 1560, 1566, 34 USPQ2d 1437, 1441 (Fed. Cir. 1993).

Moreover, the Manual of Patent Examining Procedure (MPEP) §2164.04 states that a "specification disclosure which contains a teaching of the manner and process of making and using an invention in terms which correspond in scope to those used in describing and defining the subject matter sought to be patented must be taken as being in compliance with the

enablement requirement of 35 U.S.C. §112, first paragraph, unless there is a reason to doubt the objective truth of the statements contained therein which must be relied on for enabling support".

Applicants respectfully submit that both judicial decisions and the MPEP are counter to the Examiner's position with respect to the adequacy of the disclosure of the present invention. Further, the Examiner has not shown a reasonable basis for questioning the adequacy of the disclosure to enable a person of ordinary skill in the art to make and use the claimed invention. The specification is in compliance with the enablement requirement of 35 U.S.C. §112, first paragraph, since the specification discloses a process of making and using the invention in terms which correspond in scope to those used in describing and defining the subject matter sought to be patented. For these reasons, Applicants again request reconsideration and withdrawal of the rejection to the claims presented herewith.

In the Office Action, the Examiner alleges that "without input from the first requestor or the second requestor" is not enabled by "without human intervention and/or client code", page 14, lines 16-17 in the specification since the requestors are not mentioned, and a requestor/client process or client sub-process is not a user as taught by "human intervention". This characterization of sufficiency of Applicants' specification is respectfully traversed.

As noted in the prior response, at page 11, Applicants indicate that support for the claim amendments can be found throughout the application. Various specific pages are then cited by way of example. The Office Action relies upon only three lines of these citations in stating the rejection, which is believed to be in error.

Applicants submit that one of ordinary skill in the art could make and use the invention from the disclosure in the specification, and that the amendments are fully supported by the application as filed. In Applicants' independent claims, a "first requestor of the computing environment" provides a request to be processed. This request waits on a response from a "second requestor of the computing environment". By way of further example, claim 14 recites that the receiving of the request is at a server of the computing environment, and that the first requestor is a first client and the second requestor is a second client. The specification is replete with specific examples of the first requestor making a request which requires a response from a second requestor. Applicants' independent claims then recite specific functionality for

dynamically altering one or more eligible thread pools to provide an altered thread pool set of eligible thread pools, wherein the altered thread pool set is to service the response to avoid deadlock with the request awaiting the response.

At page 15, lines 10-23, Applicants describe a client request (also referred to as an SMB request or data) being received by a server, step 406, and that responsive thereto SRB code is run to dispatch the request to an available thread from an eligible pool. The SRB code does not do much processing, for instance, it does not examine the SMB (i.e., client request) to see what it is. Since the receiving logic does not examine the request to determine the nature of the request, there is no input from the first requestor (or, similarly, the second requestor) regarding which thread pools can service the response. Thus, Applicants' receiving logic functions to schedule thread pools without evaluating the nature of the request itself, i.e., without input from the first requestor or the second requestor.

By way of further example, Applicants state at page 24, lines 12-25, that the invention "handles thread pool assignment dynamically with no indication from the client request which pool it can use." The "client request" in this sentence refers to requests/responses from either the first requestor or the second requestor, as is clear to one of ordinary skill in the art from the preferred embodiments of the invention described in the specification.

To summarize, Applicants submit that the adequacy of the disclosure of the present invention is supported by both judicial decisions and the MPEP, as well as by the level of understanding of a person of ordinary skill in the art. Should the Examiner request, Applicants can submit one or more declarations by persons skilled in the art in support of the patentability of the invention addressing the alleged enablement issue raised by the Examiner in the final Office Action. Based on the foregoing, reconsideration and withdrawal of the 35 U.S.C. §112, first paragraph rejection to claims 1, 27, 53 & 59 is respectfully requested.

Claims 1, 27, 53 and 59 were also rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. The Examiner alleges that the "requestors that do not provide input" is unclear in combination with the specification's teaching of "without" "client code".

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Also, the Examiner alleges that it is unclear how a deadlock is avoided, and that a deadlock is present in the claims.

Regarding the requirement for claims to particularly point out and distinctly claim the invention, MPEP §2171 requires a claim to be "evaluated in the context of whether the claims is definite – i.e., whether the scope of the claims is clear to a hypothetical person possessing the ordinary level of skill in the pertinent art." MPEP §2173.02 states that claims directed to patentable subject matter should be allowed if they define the patentable subject matter "with a reasonable degree of particularity and distinctness" (emphasis in original). MPEP §2173.02 further states:

Definiteness of claims language must be analyzed, not in a vacuum, but in light of:

- (A) The content of the particular application disclosure;
- (B) The teachings of the prior art; and
- (C) The claim interpretation that would be given by one possessing the ordinary level of skill in the pertinent art at the time the invention was made.

A person of ordinary skill in the art would interpret Applicants' claim language of "without input from said first requestor or said second requestor of which thread pools can service the response" in light of the specification examples provided. As recited in the independent claims, the "first requestor" comprises a requestor from which a request to be processed is received. Claim 14 makes it clear that the first requestor in one example is a first client of the computing environment. Because the claims themselves further characterize the requestor, in one example, as being clients, and since the specification discusses various embodiments of the invention relative to requests from clients, Applicants respectfully submit that the "first requestor" would be understood by one skilled in the art from the specification provided. As noted above, support for the functionality at issue recited in the independent claims can be found throughout the application as filed. Various lines of pages 15 & 24 are discussed briefly above, however, the examples provided make it clear that the first requestor from which the request is received does not provide an indication of which pool can be used to service the request. This functionality is recited to define the environment of the invention and distinguish

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the environment from other approaches wherein requests are typically accompanied with information to use a specific pool for processing. The "second requestor" is defined in the independent claims to be the requestor of the computing environment from which a response to the request is required in order to process the request. This "response" is a type of request which must itself be processed, or serviced, and that this servicing again is without input from the second requestor of which thread pool to service the response. Thus, in Applicants' invention, the dynamically altering the pools occurs within the computing environment upon receipt of the request waiting on the response, and without input from the first requestor or the second requestor of which thread pools can service the response. Since the first requestor and second requestor are defined in the independent claims, Applicants respectfully submit that the dynamically altering is recited to proceed without their input, which does not mean that there is not input from another entity of the computing environment, such as (in one example) a server of the computing environment receiving the request and awaiting the response.

Regarding "how a deadlock is avoided" and "that a deadlock is present in the claims", Applicants respectfully submit that a person of ordinary skill in the art would interpret the claims at issue in light of the specification. In the specification, Applicants subscribe that the first client sends a request to a server to be processed, and that certain requests require a callback to other clients, which must then wait for the response to the callback to be processed before the first request can be fully processed. Since there are a finite number of service threads, Applicants provide a mechanism to ensure that responses get dispatched and run, otherwise, a deadlock could exist since if a response is never serviced, a request is never fully processed and that client that sends the request waits indefinitely for the response to the request, thus resulting in deadlock. Since the scenario is clear from the specification, and since Applicants' independent claims each discuss a request from a first requestor waiting on a response from a second requestor, both of which are to be serviced by a set of one or more eligible thread pools, Applicants respectfully submit that the potential deadlock condition is clear, and that Applicants' technique for avoiding the deadlock, by dynamically altering the one or more eligible thread pools to provide the altered thread pool set, wherein one thread pool of the altered thread pool set is to service the response to avoid the deadlock with a requestor awaiting the response would be understood by one skilled in the art as being the mechanism by which deadlocks are avoided.

The dynamically altering is recited to comprise setting a pool mask to indicate the eligible thread pools of the altered thread pool set to service the response, upon which the request is waiting.

Since the independent claims are believed to define the invention with a sufficient degree of particularity and clarity for one of ordinary skill in the art, reconsideration and withdrawal of the 35 U.S.C. §112, second paragraph rejection is respectfully requested.

35 U.S.C. §103(a):

In the Office Action, claims 1, 3-4, 9-11, 14-18, 21-22, 27, 29-30, 35-37, 40-44, 47-48, 53-56, 58, 60-61, 66-68, 70-75, & 78-79 were rejected under 35 U.S.C. §103(a) as being unpatentable over Schoening et al. (U.S. Patent No. 6,205,465; hereinafter, "Schoening") in view of Belkin et al. (U.S. Patent No. 6,542,920; hereinafter, "Belkin"). This rejection is respectfully, but most strenuously, traversed.

An "obviousness" determination requires an evaluation of whether the prior art taken as a whole would suggest the claimed invention taken as a whole to one of ordinary skill in the art. In evaluating claimed subject matter as a whole, the Federal Circuit has expressly mandated that functional claim language be considered in evaluating a claim relative to the prior art. Applicants respectfully submit that the application of these standards to the independent claims presented herewith leads to the conclusion that the recited subject matter would not have been obvious to one of ordinary skill in the art based on the applied patents.

Applicants' invention is directed to the management of thread pools to service a request from a requester (e.g., a client) and a response (e.g., callback response) from another requester on which the request is waiting. For instance, a client request for a locked data file waits for another client's callback response that unlocks the data file. This thread pool management technique avoids deadlock between the request and the response on which the request is waiting by dynamically altering an eligible thread pool set (e.g., containing a primary thread pool) to provide an altered set of thread pools. The altered thread pool set includes, for example, the primary thread pool and a secondary thread pool to service the response. By allowing, for example, the secondary thread pool to service the response and providing the primary thread pool to service the request waiting on the response, deadlock is avoided. This dynamic altering

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scheme is efficient because it does not require any input from the requesters that issue the request or the response. The thread pool management technique claimed uses low-level operating system functionality that is incapable of having knowledge of client input.

As one example, applicants claim a technique for managing thread pools of a computing environment (e.g., claim 1). This technique includes receiving from a first requester of the computing environment a request to be processed. This request is waiting on a response from a second requester of the computing environment, and the response is to be serviced by a thread pool selected from a set of one or more eligible thread pools. The technique further includes, upon receipt of the request waiting on the response, and without input from the first requester or the second requester of which thread pools can service the response, dynamically altering the set of one or more eligible thread pools to provide an altered thread pool set of eligible thread pools, wherein a thread pool of the altered thread pool set is to service the response to avoid a deadlock with the request awaiting the response. The dynamically altering comprises setting a pool mask to indicate the eligible thread pools of the altered thread pool set to service the response. Applicants respectfully submit that at least the feature of dynamically altering the set of one or more eligible thread pools without input from the first requester or second requester, and wherein a thread pool of the altered thread pool set is to service the response to avoid deadlock, is not taught, suggested or implied by Schoening and Belkin, alone or in combination.

Schoening describes determining whether or not work can be run in parallel in a multi-threaded environment. When parallel processing is used, Schoening dispatches the work onto separate threads based on a partial order determined by preconditions and resource requirements associated with execution components. (see Abstract and Col. 4, lines 1-29 thereof). This parallel processing technique is different from the protocol of the present invention.

For example, applicants' claimed invention recites, in part, dynamically altering the set of one or more eligible thread pools without input from the first requester or the second requester of which thread pools can service the response. In contrast, Schoening determines, with input, which thread pools can service a response. The input used by the Schoening patent in its determination of thread pools is the partial order (e.g., evaluation sequence), which is "declared or stored in a Partial Order object and is passed as a parameter to the EvalGroup" (col. 41, lines

4-5). As depicted in FIG. 5A of Schoening, parameters associated with the evaluation sequence or partial order are passed to EvalGroup 502 from Service Module Functions (SMFs) 512 (see also col. 4, lines 6-7). SMFs receive such parameters from clients subsequent to clients acquiring access to service modules (see steps 418, 422 & 424 of FIG. 4A thereof). These clients providing the parameters are requestors as defined in applicants' independent claims. For at least these reasons, applicants respectfully submit that Schoening fails to teach, suggest or imply the above-noted aspect of applicants' invention.

Further, applicants' claim dynamically altering the set of one or more eligible thread pools (without input from the first or second requestors) to provide an altered thread pool set of eligible thread pools, wherein a thread pool of the altered thread pool set is to service the response to avoid a deadlock with the request awaiting the response. As used in the present application, "deadlock avoidance" means avoiding an indefinite wait, since if the response is never processed, there is a type of deadlock with the request waiting on the response. In contrast, Schoening does not discuss a deadlock avoidance scheme at all. Instead, Schoening describes the existence of deadlock in the case of synchronizing parallel threads (col. 3, lines 24-30) and the detection of deadlock associated with the transaction processing functions of the Asynchronous Network Interface (ANI). Although the existence and detection of deadlock is disclosed by Schoening, applicants respectfully submit that Schoening does not suggest or imply the avoidance of deadlock with a request awaiting a response using a protocol as claimed in the present invention.

In support of the rejection of the prior independent claims, the Office Action stated that Schoening teaches altering thread pools and cited col. 40, lines 61-62; col. 41, lines 3-14 & 39-42; and col. 42, lines 22-24. These sections of Schoening describe using transactions to synchronize threads; passing a partial order as a parameter to EvalGroup and evaluating that partial order; processing an execution manager subsystem object (EvalGroup) in parallel with other objects; and providing the partial order of SMFs. To the extent these cited sections are deemed applicable to the claims presented herewith, applicants traverse any conclusion that they teach, suggest or imply the above-noted features of applicants' claimed invention. As noted, the passing of the partial order parameter (e.g., the evaluation sequence) indicates a thread pool determination using input from requestors of which thread pool can service a request, which

differs from applicants' recited dynamic altering of the set of one or more eligible thread pools without input from the first or second requesters of which thread pools can service the response.

To summarize, Schoening fails to teach, suggest or imply at least the above-described recited features of (1) dynamically altering the set of one or more eligible thread pools without input from the first requester or second requester of which thread pools can service the response; and (2) the dynamically altering providing an altered thread pool set, wherein a thread pool of the altered thread pool set is to service the response to avoid a deadlock with the request awaiting the response. Applicants respectfully submit that Belkin does not overcome these deficiencies of Schoening as applied against the claims of the present invention.

For example, Belkin determines which thread pool a request is to be associated with input from a request (i.e., from a requester). In particular, Belkin describes in the Abstract thereof:

... When a request is received, it is processed to determine with which thread pool the request is to be associated. This processing is carried out by determining the type of service being requested by the request, and then determining which thread pool is associated with that type of service. Alternatively, this processing is carried out by extracting a set of indication information (e.g., a universal resource identifier) from the request, and then determining which thread pool is associated with that set of indication information ...

Belkin also discloses that the determination of the thread pool utilizes user-defined tables. For example, Belkin states that "with tables 200 and 300a, the user can freely define any thread pool, and associate any type of service with any defined thread pool" (col. 7, lines 44-46; see also FIGs. 2 & 3 thereof). Moreover, relative to user-defined table 200, Belkin describes an evaluation function to determine which thread pools are appropriate to service a request (col. 15, lines 29-44). This evaluation function's determination is "user-provided" and "based upon the request" (col. 15, lines 32-36). Thus, the determination in Belkin of which thread pool to use is performed with input from a user (i.e., client or requestor (see FIG. 1 thereof)) of which thread pool is to service a request, which is clearly different from a process which dynamically alters a set of one or more eligible thread pools without input from a first requester or a second requester of which thread pools can service the response, as recited in the claims presented herewith.

Further, Belkin describes detection of deadlock when a thread pool has no free threads available (col. 16, lines 3-5). Belkin's detection of deadlock is directed to invoking the evaluation function to order requests on a queue associated with the thread pool (col. 16, lines 14-43). The invocation of the evaluation function in Belkin does not address deadlock avoidance, per se, as claimed by the present invention. Instead, it provides the dispatching code in Belkin with input regarding the thread pool on which the request is to be placed, and where to put the request on the queue. Moreover, this deadlock-prompted action associated with input of which thread pool can service a request is different from the deadlock avoidance recited by the claims presented herewith, wherein a thread pool of the altered thread pool set is to service the response to avoid a deadlock with the request awaiting the response, and the altered thread pool set is provided by the dynamic alteration of the set of one or more eligible thread pools without input from the first requester or the second requester of which thread pools can service the response.

In the Office Action, it is stated that Belkin teaches dynamically determining different eligible thread groups, and col. 4, lines 38-39; col. 7, lines 41-42; col. 15, lines 33-35 and col. 16, lines 44-46 of Belkin are cited. These sections disclose implementing multiple thread pools; specifying, by means of a row of a table, an association between a particular thread pool and a particular type of service; invoking the user-provided evaluation function to evaluate a request; and invoking the evaluation function by a request processing mechanism. Applicants respectfully traverse any conclusion that these cited sections of Belkin teach, suggest or imply the subject matter of the claims presented herewith. As noted, the invocation of the evaluation function based on a request and the user-defined associations in the table provide input of which thread pools can service a request, which is in contrast to the dynamic alteration without input from the first or second requesters of which thread pools can service a response, as recited in the claims presented herewith.

Since both Schoening and Belkin fail to teach or suggest applicants' claimed protocol of (1) dynamically altering the set of one or more eligible thread pools without input from the first requester or second requester of which thread pools can service the response; and (2) the dynamically altering providing an altered thread pool set, wherein a thread pool of the altered thread pool set is to service the response to avoid a deadlock with the request awaiting the

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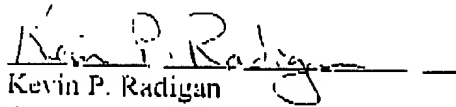
response, it is respectfully submitted that the combination does not render the present invention obvious.

For the above reasons, applicants respectfully request reconsideration and withdrawal of the obviousness rejection of independent claims 1, 27, 53 & 58. The dependent claims are believed patentable for the same reasons as the independent claims from which they directly or ultimately depend, as well as for their own additional characterizations.

All claims are believed to be in condition for allowance and such action is respectfully requested.

Should the Examiner wish to discuss this case further with applicants' attorney, the Examiner is invited to telephone their below-listed representative.

Respectfully submitted,


Kevin P. Radigan
Attorney for Applicants
Registration No.: 31,789

Dated: May 28, 2004.

HESLIN ROTHENBERG FARLEY & MESITI P.C.
5 Columbia Circle
Albany, New York 12203-5160
Telephone: (518) 452-5600
Facsimile: (518) 452-5579